

Claims

- [c1] 1. A method of fabricating a bipolar junction transistor, the method comprising:
providing a substrate, the substrate comprising a plurality of isolation structures for defining at least an active area;
implanting ions of a first conductive type into the substrate to form a doping region in the active area;
forming a protective layer on the substrate, the protective layer comprising an opening to expose the doping region; and
forming a first doping layer of a second conductive type and a second doping layer of the first conductive type on the doping region.
- [c2] 2. The method of claim 1 wherein the doping region comprises an N-type doping region.
- [c3] 3. The method of claim 2 wherein the first doping layer comprises a P-type epitaxial layer made of silicon/silicon germanium.
- [c4] 4. The method of claim 2 wherein the second doping layer comprises an N-type epitaxial layer or an N-type

polysilicon layer.

[c5] 5. The method of claim 1 further comprising the following steps when forming the first doping layer and the second doping layer on the doping region:
forming a first epitaxial layer of the second conductive type and a second epitaxial layer of the first conductive type on the substrate;
removing a portion of the second epitaxial layer to form the second doping layer on the doping region;
implanting ions of the second conductive type into the first epitaxial layer; and
removing a portion of the first epitaxial layer to form the first doping layer on the doping region.

[c6] 6. The method of claim 1 further comprising the following steps when forming the first doping layer and the second doping layer on the doping region:
forming an epitaxial layer of the second conductive type and a doped polysilicon layer of the first conductive type on the substrate;
removing a portion of the doped polysilicon layer to form the second doping layer on the doping region;
implanting ions of the second conductive type into the epitaxial layer; and
removing a portion of the epitaxial layer to form the first doping layer on the doping region.

[c7] 7. The method of claim 1 further comprising the following steps when forming the first doping layer and the second doping layer on the doping region:
forming a first epitaxial layer of the second conductive type and a dielectric layer on the substrate;
removing a portion of the dielectric layer in the active area down to a surface of the first epitaxial layer;
forming a second epitaxial layer of the first conductive type on the substrate;
removing a portion of the second epitaxial layer outside the active area to form the second doping layer on the doping region;
removing the entire dielectric layer; and
removing a portion of the first epitaxial layer to form the first doping layer on the doping region.

[c8] 8. The method of claim 1 further comprising the following steps when forming the first doping layer and the second doping layer on the doping region:
forming an epitaxial layer of the second conductive type and a dielectric layer on the substrate;
removing a portion of the dielectric layer in the active area down to a surface of the epitaxial layer;
forming a doped polysilicon layer of the first conductive type on the substrate;
removing a portion of the doped polysilicon layer outside

the active area to form the second doping layer on the doping region;
removing the entire dielectric layer; and
removing a portion of the epitaxial layer to form the first doping layer on the doping region.

- [c9] 9. The method of claim 1 further comprising:
forming a spacer on either side of the first doping layer and on either side of the second doping layer; and
forming a silicide layer on surfaces of the doping region, the first doping layer and the second doping layer.
- [c10] 10. The method of claim 1 wherein the doping region comprises an emitter of the bipolar junction transistor, the first doping layer comprises a base of the bipolar junction transistor, and the second doping layer comprises a collector of the bipolar junction transistor.
- [c11] 11. The method of claim 1 wherein the doping region comprises a collector of the bipolar junction transistor, the first doping layer comprises a base of the bipolar junction transistor, and the second doping layer comprises an emitter of the bipolar junction transistor.
- [c12] 12. A method of fabricating a bipolar junction transistor, the method comprising:
providing a substrate, the substrate comprising a plural-

ity of isolation structures for defining at least an active area;
implanting ions of a first conductive type into the substrate to form a doping region in the active area;
forming a protective layer on the substrate, the protective layer comprising an opening to expose the doping region;
forming a first doping layer of a second conductive type and a second doping layer of the first conductive type on the substrate;
removing the second doping layer except the portions of the second doping layer covering the doping region;
implanting ions of the second conductive type into the first doping layer; and
removing the first doping layer except the portions of the first doping layer covering the doping region.

[c13] 13. The method of claim 12 wherein the doping region comprises an N-type doping region.

[c14] 14. The method of claim 13 wherein the first doping layer comprises a P-type epitaxial layer.

[c15] 15. The method of claim 13 wherein the second doping layer comprises an N-type epitaxial layer or an N-type polysilicon layer.

- [c16] 16. The method of claim 12 further comprising:
forming a spacer on either side of the first doping layer
and on either side of the second doping layer; and
forming a silicide layer on surfaces of the doping region,
the first doping layer and the second doping layer.
- [c17] 17. The method of claim 12 wherein the doping region
comprises an emitter of the bipolar junction transistor,
the first doping layer comprises a base of the bipolar
junction transistor, and the second doping layer com-
prises a collector of the bipolar junction transistor.
- [c18] 18. The method of claim 12 wherein the doping region
comprises a collector of the bipolar junction transistor,
the first doping layer comprises a base of the bipolar
junction transistor, and the second doping layer com-
prises an emitter of the bipolar junction transistor.
- [c19] 19. The method of claim 12 wherein the protective layer
comprises an oxide layer or a silicon nitride layer.